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Paper Session III-A - Space Policy and Social Ethics

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Introduction

While always controversial, the United States space exploration program has recently come under increased criticism as an extravagance that a debtor nation cannot afford. There are questions raised in times of budget austerity about the funding and policy implementation for the programs that are designed to increase human's understanding and presence outside of earth's biosphere. But advocates of an aggressive space policy point to technological advances and scientific breakthroughs that improve the quality of life and our understanding of the universe that are made possible by an active space program. The social ethics of space exploration is a topical issue that requires serious deliberation.

Social Ethics

Ethics is the study of morally correct principles and behavior, which can be understood simply as "doing the right thing." Social ethics, as it applies to science, is the judgment of the value of a body of scientific work to society in terms of providing for the common good and improving the quality of life. It is concerned with the consequences of experimentation[1]. Cost versus benefits is currently the most important issue of social ethics in the area of space policy.

Social ethics can be difficult for a scientist to address for a number of reasons. Unlike physical laws and engineering principles, there are no clear-cut standards or absolutes that can be applied in order to aid the decision-making process. All values are relative. The decision-making process is made in the raucous forum of public debate rather than the quiet and deliberate atmosphere of a laboratory. Politics may also play a role. Scientists might not know what is expected of them in decisions involving social ethics. It has been stated that:

> "the key to good science policy is informed assent, in which legislators accept the need for scientific advice on the mechanics of achieving their goal, and scientists recognize that legislators have the right to set the strategic goals based on societal needs."[2]

It is appropriate for there to be much discussion about science policy among all representatives of society since social ethics is inherently involved in values clarification on a societal level. Regardless of the sense of urgency and significance experienced by scientists for their work, it is important for them to trust social policy to be developed by elected and appointed officials responsible for that function.

But scientists still serve an important role in social ethics. They can provide inspiration to their fellow citizens and stir the collective imagination towards creating a better existence. Humans in general and scientists in particular are curious animals by nature. We are driven to improve the world. We delight in the creative process, discovering new information, and solving problems. Among all animals, we alone spend considerable energy attempting to understand the nature of the universe. We thrive on a sense of helping our fellow beings[3]. It is the mission of scientists to be the voice for these visionary concepts and actions in public debates regarding social ethics.

Space Policy and Social Ethics - Decision Making

The utilitarianism theory of moral ethics is concerned with finding the overall balance of good over bad consequences in decision making[4]. The policy alternative combining the best combination of maximized benefits and minimized costs can then be selected[5]. So the social ethics question of whether our space policy is worthwhile becomes largely an issue of economic cost versus benefit.

The space program has been criticized as being too costly since its inception. There has never been a lack of social critics and policy makers ready to point out alternate uses of funds instead of space exploration even during the glory days of the Apollo program when NASA was enjoying widespread public support. More recently a Congressional measure that would have terminated funding for the proposed Space Station was narrowly defeated last year.

It is therefore important to accurately determine the actual benefits that are enjoyed as a result of U.S. space policy. Then an assessment of the value of these benefits can be compared to the costs in order to judge if the policy is achieving maximum benefits at minimum costs. The relative value of our space policy to society can then be concluded.

Although the space program has yielded numerous benefits through direct experimentation and spin-offs in medicine, computerization, and other technology, this paper can only focus on a few benefits in the social sciences.

Benefits - Environment Awareness

By definition, space exploration is concerned with the vast universe beyond Earth. But one of the most important and ironic benefits of the space program is its affect in increasing our knowledge and appreciation for our home planet. As explained by one author:

> "The first photographs taken by Apollo astronauts of the whole Earth suspended in space generated a revolution in humanity's view of itself and its world, changing many fundamental human perceptions on which our actions are based. Today the photo of planet Earth as seen

> from space is the icon of the environmental movement, embodying an understanding of a unique and fragile holistic "spaceship Earth," where human actions and natural processes interact in a global system that does not recognize national boundaries."[6]

Even though the stated purpose of the Apollo missions was lunar exploration, our perspective of Earth was permanently changed when we saw our planet through the eyes of the astronauts from space. I do not believe that it is a coincidence or accident that the environmental movement gained so much support in the time immediately following humans' first journeys to the moon.

But the deliberate and intentional exploration of Earth itself has become a very important element of current space policy. The most striking example is the Mission to Planet Earth program. This international scientific cooperation, designed to monitor and catalog many critical factors of the Earth's environment, will vastly increase our understanding of our native planet. A greater appreciation for the interaction between humans and the biosphere is inevitable.

Benefits - International Relations

It is important to remember that space policy was initially developed as a result of Cold War tensions that existed between the U.S. and the U.S.S.R. in the late 1950's and 60's. Exploration of space provided a forum in which the superpowers could compete without resorting to armed conflict, the coveting and destruction of territory and property, and injury or harm inflicted on military personnel or innocent civilians. That is no small accomplishment. Space exploration led the U.S. and all other spacefaring nations to sign agreements through the United Nations that guarantee the rights of all nations to explore and use outer space for peaceful purposes, ban the deployment of offensive weapons based in space, and reject claims of sovereignty by any nation over outer space or celestial bodies[7]. The U.S. signed agreements in 1988 with the European Space Agency, Japan, and Canada for participation in Space Station Freedom[8]. These parties signed an agreement with Russia last December that invited their partnership in a redesigned station. Space provides a forum for nations to relate to each other in a new spirit of cooperation instead of the same old confrontational ways. NASA Administrator Dan Goldin expresses a desire that:

> "When we go to Mars, I hope we go to Mars and plant one flag, and not go to Mars and plant an American flag, and a Russian flag, and a European flag, and start the same old conflicts on another planet."[9]

But the benefits from space exploration are not limited to spacefaring and industrial nations. Three-fifths of the Earth's land mass is inhabited by developing nations who can participate in and benefit from space science[10]. Participation comes in the form of making land-based observations to collaborate, confirm or elaborate on findings made by remote sensing satellites. The infusion of new technology into these countries by the deployment of scientific equipment, scientists, and technicians needed for these observations immediately increases the level of technical literacy. Sensitive planning can phase in training for locals and eventually turn over responsibility to them for the equipment maintenance and information collection. This increases education, provides jobs, and creates an understanding of the complex issues facing preservation of the fragile ecosystem. It invites participation and includes all parties in uncovering solutions. It can be argued that developing nations are at a disadvantage as an equal partner in implementing science and new technology to solve social issues. But developing nations are not already heavily invested in older technology and so have less inertia to overcome than developed nations in implementing new technology. So new technology actually offers an advantage to undeveloped countries, and can be one way of achieving more equal relationships in international relations[11].

Developing nations can benefit from space exploration by industrial nations by receiving information taken from remote sensing satellites. Information from space based disaster warning observation system are shared globally, offering the possibility of preventing some damage and loss of life. Longer term observations can allow developing nations to form strategies to deal with social issues. For example, drought prediction can allow local governments to make plans to provide adequate food for their population. Remote sensing also can map areas for mineral deposits that can be harvested for economic advantage.

But the greatest advantage of space exploration on international relations is in creating a true sense of global community by presenting an image of one undivided planet instead of the traditional map-makers' image of countries divided by artificial boarders. A science official from Pakistan explains:

> "The exploration of space and space applications in particular are by their very nature global in character and international in scope. Further, such activities are expensive. Because of these factors, space exploration and applications hold enormous promise as a means of bringing all nations together to participate in an activity that has many benefits to offer to mankind. Experience of space research activities during the last few decades has clearly shown that even space-faring nations cannot optimize their programs without the cooperation of other countries because of the global nature of these programs. The need for international cooperation in the field of space activity, therefore, is vital both for the developed and the developing countries."[12]

Space exploration provides a way of industrial nations to share their wealth in the form of information and knowledge with developing nations without the threat of reducing the worth of the developed nations. Space sciences benefits international relations by promoting the idea that we are one people inhabiting the same planet.

Conclusions

The choice to undertake long-term projects using public funds is never easy, and is seldom without some controversy. It is always easier to spend the money on projects that bring immediate gratification. But cost analysis must also take into account the long-term benefits that will serve future generations. A recent report by the Department of Transportation about the condition of public bridges in New York City shows rare elegance in explaining the importance of the social ethics of public funding for long-term projects:

> "As we began our investigation of the condition of the bridges of New York City, we soon came to understand the generosity of generations long ago. Not only were decisions made at the turn of the century to build bridges that would last hundreds, perhaps thousands of years; but the bridges, once built, were given constant attention to ensure their continued vitality. The choice of our generation is simple. We can care for the public works and let generations we will never meet inherit the vital foundations of a thriving economy. Or we can exhaust whatever value is remaining in our bridges, and let our children inherit a pile of rubble. This is a question of generational ethics - we owe a debt to those generations past, and we can only repay it by making our contribution to the City lasting."[13]

We might consider the space program along similar ethical guidelines. The accomplishments of the Apollo era are fading as new generations are born after the lunar exploration missions. The programs along with the hopes and ideals of scientific exploration are taken for granted. When governments struggle with economic problems, it becomes easy to eliminate the costly science programs and divert the funds to other areas.

Most important is the need for strong leadership in proposing, explaining, and implementing space policy. The President is often looked to for leadership in issues of social ethics in a secular society such as ours. There is no better example than President Kennedy's bold initiative to put men on the moon and return them within ten years. Kennedy was rewarded with increased faith in his leadership as a result. It has been noted that:

> "The energy and dynamism that American society experienced under Kennedy in large part stemmed from our rapid progress in space."[14]

While NASA proposed very bold programs after the lunar exploration mission was destined for success, the President and Congress failed to provide leadership in either the proposed programs or alternatives. The formulation of space policy was abandoned to scientists and engineers instead of the policy-makers elected to make such decisions. While the resulting

Space Shuttle program is often referred to as a source of national pride, it does not enjoy the widespread popularity and enthusiasm that the Apollo lunar program did. The explorer Jacques Cousteau has commented:

> "I'm a true believer of two contradictory things, the inspiration from a leader and the necessity of a collective enthusiasm. They seem contradictory because inspiration cannot come from the mass - it has never come from the mass. Thus, the types of things that we [are] talking about today in flight exploration have to be inspired and triggered by a leader, but they have to be met with the acceptance and the enthusiasm of all the crowd. That was the case for the first years of space exploration."[15]

Some attempts of more recent administrations to provide strong leadership in space met only mixed results. Clearly, commercialization of space is not currently feasible. The business of space is too expensive and the economic returns are too long-term to be a project for private enterprise. It requires some government backing to be successful.

The exploration of space as a government project is a worthwhile undertaking if consideration is given to its benefits towards national pride. The latest published Civil Space Policy states that out national space program shall contribute to "pride, sense of well-being and direction, as well as U.S. prestige and leadership"[16]. In arguing for cooperation with Russia in space ventures, NASA Administrator Dan Goldin noted that Russia's space program is a source of national pride and that Russian space requirements will be filled by other countries if the U.S. does not participate[17]. National pride as expressed through science and technology is clearly an issue that is important to social ethics and values.

Another important social value that is expressed through our space policy is our inherent interest in the natural universe. As animals, we are driven to explore. Dan Goldin compares the current use of space policy to satisfy our curiosity to our historical drive to explore:

> "There's this analogy of Prince Henry, navigator of Portugal, who got all of the shipbuilders, map makers and sail makers together and said, look, the way you find the unknown is to define the boundaries of the known, then press on beyond those boundaries."[18]

The author Lewis Thomas was also intrigued with the use of science as a part of human's inherent nature:

> "This is the greater danger for our species, to try to pretend that we are a another kind of animal, that we do not need to satisfy our curiosity, that we can get along somehow without inquiry and exploration and experimentation, and that the human mind can rise above its ignorance by simply asserting that there are things it has no need to know."[19]

Humans are curious animals, we relate to each other partly by asking questions. Science provides answers. But for each answer science provides, it poses several more questions. Therefore, the active pursuit of scientific inquiry addresses our human nature by simultaneously answering our questions and providing new material to ponder.

In previous times, answers to the questions about our existence were expressed in the form of myths, legends, analogies, and parables. The modern and post-modern era are marked by the use of science and logic in order to resolve central questions as to our origins and purpose in life. Humans engage in scientific inquiry by forming models in their minds based on observations and conjecture. Part of human nature is to share these models with others. The scientist Philip Morrison contends that:

> "I believe those cultures which manage to show public concern for filling in the edges of [their] models, for extending the margin of the map, are those in which we now live."[20]

Remaining on our planet physically and psychologically distorts our models and our perception of our relationship to the universe. The atmosphere distorts our vision of the rest of the universe. Psychologically, our model is distorted if we base all of our observations on Earth- and human- centered perspectives. Without exploration beyond our planet, much of science about the universe is theory. Exploration provides facts which are needed to complete and authenticate our models.

Space exploration can provide the important transition between science and religion. Religious works contain references to the natural world, the Earth, the celestial bodies, humans and other life forms. While these books are strong on faith, they are weak on scientific evidence. On the other hand, science often is excellent at explaining natural phenomenon but lacks the authority on aspects of existence that defy rational explanation. One professor of philosophy has expressed hope for space exploration as the bridge between faith and thought:

> "The space program likely will sharpen awareness of the fundamental unity of nature and of humans as a natural development of the same natural force responsible for all cosmic activity. Thus the space program can help focus attention on the uniqueness of each human as an individual and on the individual's relation to society and the rest of nature, thereby reinforcing a current of thought already extant in the life sciences."[21]

Science has influenced the direction and tone of Western civilization. It now contends with religion as a dominant force in human's task of explaining his role and function in the universe.

The relationship of space policy to social ethics is inextricably involved in human's continuing efforts towards self-definition. Social ethics affects space policy. The importance of the things we value is represented by what tasks we choose to pursue. Space policy affects social ethics. The knowledge that we have gained as a result of our exploration of space has affected our view of ourselves, our universe, and what we value.

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